McMASTER UNIVERSITY

GRADUATE PROGRAM IN STATISTICS

STATISTICS SEMINAR

Speaker: Dr. Eleanor Pullenayegum
Department of Clinical Epidemiology and Biostatistics
McMaster University

Title: Fitting Marginal Structural Models

Day: Tuesday, November 27, 2007

Time: 3:30 - 4:30 PM

Place: HH/217 - Deloitte Colloquium Room
(refreshments in HH/216 at 3:00 PM)

SUMMARY

In many real-world problems, the question is whether there is a causal relationship between two variables. Thus, in a study of second-hand smoke and lung cancer, we are not interested so much in whether exposure to second-hand smoke is associated with lung cancer, as we are in whether second-had smoke causes lunch cancer. The gold-standard method for obtaining causal inferences is the randomized trial, however, randomization is not always possible. Marginal structural models (MSMs) are an increasingly popular framework in which observational data is re-weighted in order to draw causal inferences. The ability of an MSM to accomplish this rests crucially on treatment/exposure being unconfounded by covariates in the re-weighted dataset. This talk will first introduce marginal structural models, and then discuss how this important property of the weights can be evaluated when both the treatment and the covariates are time-dependent. Often treatment effect estimates will be sensitive to the choice of weights. A framework within which to explore reasons for this sensitivity and to select a good weighting scheme is suggested. The methods are illustrated using a study of juvenile dermatomyositis.

REFERENCES

- Robins JM, Hernán MA, Brumback B. (2000) Marginal structural models and causal inference in epidemiology. *Epidemiology*, **11**, 550-560.
- Hernán MA, Brumback B, Robins JM. (2000) Marginal structural models to estimate the causal effect of zidovudine on the survival of HIV-positive men. *Epidemiology*, **11**, 561-70.

ABOUT THE SPEAKER

Eleanor Pullenayegum is Assistant Professor in the Department of Clinical Epidemiology and Biostatistics at McMaster University and a Biostatistician in the Biostatistics Unit at the Father Sean O'Sullivan Research Centre, St. Joseph's Healthcare Hamilton–a Division of St. Joseph's Health System. She received a PhD in Biostatistics from the University of Toronto, then spent a year as a Post-Doctoral Fellow at the Department of Statistics and Actuarial Sciences at the University of Waterloo.

Before coming to Canada she did a BA in Mathematics at Gonville and Caius College, University of Cambridge, followed by the Certificate of Advanced Studies in Mathematics, also at Cambridge. She then worked as a Research Assistant and consulting statistician for the Centre for Applied Medical Statistics at the Department of Public Health and Primary Care, University of Cambridge.

Dr. Pullenayegum is interested in developing statistical methodology for healthcare research. A particular area of interest is in semi-parametric regression models in the presence of incomplete data. An example where this methodology is used is in estimating cost-effectiveness, where we often need to fit a linear regression model for mean cost, without making additional distributional assumptions. In this example, incompleteness arises from right-censoring. A more surprising example occurs when fitting marginal structural models, in which the counterfactual outcomes are, by definition, unobserved. She is interested in comparing estimation techniques in terms of their bias, efficiency and practicality.

MORE SEMINAR INFORMATION

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